Learning by Leading: Dynamic Mentoring to Support Culturally Responsive Mathematical Inquiry Communities

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While there is widespread agreement that *all* learners of the 21st century need to be numerate and literate, reforming pedagogical practices to achieve such an outcome is challenging for many teachers. This is a report of one aspect of a project which aims to integrate a culturally responsive pedagogical mathematics practice within communities of mathematical inquiry. The focus of this report is on the exploration of dynamic mentoring from the perspective of teachers. The results demonstrate how 'in the moment' actions from mentors during lessons cause reflective transformations in pedagogical practices.

Introduction

The teaching and learning of mathematics in New Zealand has undergone a critical transformation over recent decades. Prompted by a serious decline in national mathematics achievement statistics as well as a political expectation for all students to be knowledgeable and able to succeed in the 21st century has placed focus on need for *all* students to be literate and numerate (Alton-Lee, 2011). Initial efforts to reconceptualise the teaching and learning of mathematics are evident in the New Zealand Numeracy Development Project (NZNDP), a professional development project which aimed to increase teacher proficiency to teach, assess, and have students explain a range of different strategies (Ministry of Education, 2004). While many students benefitted from the reformed pedagogy inherent in the NZNDP, the national mathematics achievement results for Māori and Pāsifika students show a continued decline (Ministry of Education, 2012). Our way forward has been to put in place not another intervention, but rather a re-invention *Developing Mathematical Inquiry Communities* (*DMIC).* Our project *DMIC* is designed to integrate best pedagogical mathematics practice within culturally responsive teaching. This transformative approach calls for significant changes in teacher practices as a way to reverse the persistent underachievement of Māori and Pāsifika and other diverse groups of student—changes which hold many challenges. The use of mentors is one of the ways in which we support teachers to make these changes. In this paper we consider the role of mentors as they engage with teachers to transform their pedagogical practices. In particular, we explore the perceptions the teachers hold about the role of mentors and the actions and prompts they report mentors use to cause reflective change as they co-construct mathematical inquiry communities.

Specifically the focus of *DMIC* is on the development of classroom communities of mathematical inquiry and the participation and communication patterns that support construction and use of proficient and reasoned mathematical practices (Hunter, 2008). The central tenets of *DMIC* include the use of group-worthy (Featherstone et al., 2011) mathematically rich and challenging tasks and practices. The tasks and practices are embedded within, and are responsive to the cultural diversity of the classroom community

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in ways which connect to both student cultural identity and mathematical disposition (Bills & Hunter, 2015). Inherent in the project is a goal to engage students who come to the mathematical activity with a wide range of prior knowledge and experience to work together collectively in mixed ability groups to develop deep and rich connections in their mathematical understandings. Our intent parallels that described by Sullivan, Walker, Borcek, and Rennie (2015) in that we want students to construct their own connected understandings through use of inquiry and a range of mathematical practices including argumentation, prior to being instructed by teachers. At the same time, we want teachers to draw on the values of the different cultural groups represented in ways which are responsive to "students' cultural ways of being" (Civil & Hunter, 2015, p. 296) and use these to shape their social ways of interacting (Hunter, 2013).

Construction of mathematical inquiry communities presents significant challenges for teachers. Many New Zealand teachers lack experience of teaching or learning in inquiry environments and given their recent teaching experiences within the ability grouping arrangements and prescribed curriculum of the NZNDP (Hunter, 2012) the changes required in *DMIC* challenge their fundamental beliefs about learning and teaching. A range of literature (e.g., Boaler, 2009; Hattie, 2002; Rubie-Davies, 2015) has outlined the deleterious effects of streaming on student achievement. The reasons are many, but one clear factor aligned to streaming are the beliefs held by teachers about who can or cannot do mathematics and the close link between teacher expectations, teacher beliefs and teacher practices. The expectation in *DMIC* is that mixed ability grouping will be used and embedded within culturally and contextually relevant challenging tasks, this requires that teachers not only change what they teach, but also how mathematics is taught and who they perceive can do mathematics.

Changing teacher practices is a difficult and lengthy process with many challenges. These include challenges to both teachers and students alike. As Sherin (2002) described in a study designed to establish an inquiry mathematics community, the teachers were required to rethink their roles and responsibilities and those of their students within the discourse patterns they structured in the classroom community. In such communities, wider diversity in the roles, task demands and interactional scripts are also demanded of the students (Forman, 1996) as all members of the community are required to draw on and use a range of mathematical practices to explain, represent, justify and generalise their reasoning. Providing students with space to engage in disciplined ways of reasoning and inquiry presents considerable challenge (Ball & Lampert, 1999; Franke & Kazemi, 2001). The role of the teacher as the unquestionable authority is under scrutiny. Assuming responsibility "to propose and defend mathematical ideas and conjectures and to respond thoughtfully to the mathematical arguments of their peers" (Goos, 2004, p. 259) is often not familiar to, nor used automatically by students. Moreover, many students on entry into inquiry classroom communities may hold contrary beliefs about argumentation, considering it either unnecessary or impolite (Civil & Hunter, 2015; Rittenhouse, 1998). As a result, teachers are often required to learn 'in the moment' as they teach (Davies & Walker, 2005).

What is required of teachers is the ability to adapt and learn new practices quickly within dynamic and rapidly changing environments. Traditional professional development processes may not be sufficient to keep them abreast with the complexity and diversity of the landscapes of such 21st century learning communities. Pivotal to their learning and them embracing change in *DMIC* has been the role of mentors. In the next section we will

clarify why we use mentors and how we use the terms mentor and mentoring as well as examine the literature around the mentoring process.

Mentoring to learn

Mentoring is a term often used interchangeably with that of coaching and facilitating. Gallant and Gilham (2014) explain that some literature separates mentoring from coaching because of the perceived presence of reflection inherent in mentoring. However, coaching within educational programmes can cause reflection. Fletcher (2012) describes how mentoring and coaching is often positioned at two opposite ends of a continuum, with coaching being seen as more practical and hands on while mentoring is perceived as more abstract and reflective. In our work we consider that coaching and mentoring are overlapping entities and we combine both within what we term 'dynamic mentoring' to describe the many and varied roles our mentors assume 'in the moment' within classrooms.

The term mentor has its historical roots in the character Mentor from Homer's Odyssey who acted in the role of a wise and trusted counsellor (Armitage, 2006). In line with how Mentor acted in his role with Telemachus our mentors also assume a wise and responsive relationship with teachers. They have experienced dynamic mentoring and grappled with the challenges of adopting heterogeneous grouping as they co-constructed the pedagogy of Mathematical Inquiry Community classrooms themselves. They have also illustrated high levels of expertise as culturally responsive and proficient and experienced teachers of mathematics within *DMIC* classrooms. Their combined expertise at teaching mathematics with proficiency and their personal experience as a mentee supports them to assume the role of mentor for others.

Within dynamic mentoring their mentor role is a constantly changing one which may include them assuming the role of adviser, a senior practitioner with expertise, willing and able to share their expertise; a coach able to model and provide specific feedback; a nurturer who provides support and encouragement; a resource who provides further information or provides access to further information and; a role model able to demonstrate flexible and reflective practices. In this way our mentors are required to wear many hats while also needing to fit within the diverse world of teachers who teach in our high poverty schools where the predominant group of students are Māori and Pāsifika.

The mentoring partnership is premised on a relationship in which all participants are active learners. Mentoring has come under considerable criticism in some literature (e.g., Feiman_Nemser, 1996; Hawkey, 1998) for its vague and what may appear to be a purposeless approach. Our stance on understanding mentoring fits within that used by Cochrane-Smith and Lytle (1999) in which mentors and mentees take an inquiry stance "to generate local knowledge, envision and theorize their practice, and interpret and interrogate the theory and research of others" (p. 289). The mentor roles adopted in *DMIC* parallel what Carr, Herman, and Harris, (2005) describe as a holistic shared reflective and dynamic process in which together the mentors and teachers have committed to collaborative construction of effective pedagogy and improved learning outcomes for students within a learning community. Carr and her colleagues describe how within such learning communities all members of the community are positioned as learners as they reflectively examine, explore, and adapt practices which best fit the current needs of each individual. They explain how when such interactions are embedded in the school culture new synergies evolve which cause a shift towards collaborative school renewal.

Within our project dynamic mentoring is a process designed to open up each and every teacher's potential growth in both mathematical and culturally responsive pedagogical

practices. The mentoring occurs within mathematical inquiry communities in classrooms, and in learning communities within individual schools as well as across local schools. The mentors work within a process built on mutual respect, trust and the sharing of understandings and experiences. The mentoring is designed to build a legacy of knowledge in each setting; with the individual teachers, schools, and across groups of schools. The dynamic mentoring process serves the purpose of moving the mentoring partnership from an informal relationship to a more formal one and it incorporates the key elements of relationship building with a well-developed plan for individualised development.

Engaging in dynamic mentoring requires that a mentor carefully considers a teacher's whole situation. This includes such factors as their personal circumstances and any psychosocial factors which may impact on their ability to progress towards constructing changed pedagogy (Kise, 2005). Rubie-Davies (2015) argued that teacher resistance to change is closely tied to their beliefs. However, Kise illustrated that when teacher's strengths and core beliefs were considered and individually responded to, the teachers were able to reflectively reconstruct their practices and expectations of students. Kise challenges us to consider how individuals may be "hindered by feelings of helplessness, fears of student misbehaviour, and their own habitual beliefs" (p. 47). Kensington-Miller (2004, 2005, 2006) in a senior secondary school study in low socio-economic schools in urban Auckland described the outcomes of a project designed to improve participation and achievement of Māori and Pāsifika in mathematics. Her key findings showed that although issues of hierarchy affected the mentoring relationship the main problem centred on the fears teachers had about being exposed to their colleagues and others as less than competent. Kensington-Miller describes how, as relationships within the community of practice strengthened, the mentoring partnerships became powerful agents of change.

Much of the research on mentoring is situated in a business world or in the health world where the job of the mentor is to navigate the less experienced person towards a successful career move. Within an education setting, most often the research on mentoring has been applied to preservice or early career teachers and less so within the wider education field. Nevertheless consistently across the different fields the traits of an effective mentor include the following; accessibility and reliability, empathetic, open-mindedness, integrity, patience, and honesty. Orland-Barak and Hasin (2010) across collective case studies showed that exemplary mentoring practice had many similar characteristics to exemplary pedagogical practices, a tight correlation between their descriptions of good practice and their behaviour in practice but also that the outstanding mentors thought and behaved "as transformative leaders, exhibiting characteristics that are close to those of good leaders" (p. 434). Furthermore, Orland-Barak and her colleague showed how what appeared to be exemplary mentoring practices in one context were not in a different context. Nevertheless, those mentors who exhibited consistent exemplary practices maintained "significant *similarities* in their perspectives, reflected both in their language of practice and in their actions *despite the different contexts*" (p.434). This correlates strongly with the mentors in our project.

The context of the *DMIC* Project and the processes of data collection

Within our *DMIC* project mentors are one aspect of our work to develop mathematical inquiry classrooms and are the focus of this paper. However, they are only one component of the professional research and development project. In the next section I will outline other components of the project and provide the background to the development of it.

The seed for *DMIC* was sown 13 years ago in a doctoral study (Hunter, 2007a). A group of teachers in an urban school in a high poverty area with predominantly Māori and Pāsifika students worked collaboratively with the researcher to develop a Communication and Participation Framework (Hunter, 2008). The Framework was a tool designed to scaffold teachers to engage students in reasoned mathematical practices within communities of mathematical inquiry. Subsequent iterations of the research gradually increased the number of schools, as the teacher educators and researchers (as mentors) involved deepened the focus on culturally responsive pedagogy and ambitious teaching (Kazemi, Franke, & Lampert, 2009).

The thirty schools who are currently part of the project attend four full days of professional learning over the year. Particular focus is placed on the use and exploration of problematic and group worthy tasks within contexts relevant to the lived reality of Māori, Pāsifika, and other diverse learners (Bills & Hunter, 2015). The use of mixed ability grouping aligned with the cultural values of the students which support collectivism and communalism rather than individualism is examined along with complex instruction (Hunter, 2007b). Mentors also work with the individual teachers in their classrooms co-constructing mathematics together, on average once a month. All in-class sessions are videoed and subsequently used for teachers to reflectively analyse. All mentor actions are included in the video records and these are analysed and discussed by the mentors for professional growth.

The data reported in the following section was sought from 227 teachers across class levels from Year 1-8 serving low socio-economic communities. The teachers responded to open-ended questions about their involvement in *DMIC*. One section of the questions asked them to describe the role they perceived mentors took when working with them in their classrooms. They were also asked to identify the actions which mentors had taken during in-class support sessions which had caused them to reflect on and change their practices. The video records of four mentors in-class mentoring were selected to be wholly transcribed and analysed. The analysis focused on mentor and teacher moves using the codes suggested by Lampert and her colleagues (2010) but modified to fit our context. The data gained from video transcripts of one of the lessons is used in this article. This does carry the risk of over-generalising from the one lesson but the focus of this report is on the actions the mentor takes 'in the moment' and this lesson is representative and provides clarity around the types of actions of mentors across lessons.

Results and discussion

In the first section we outline what the teachers stated they considered were the role of the mentors as they worked with them in their classrooms. Many of the roles overlapped as did the actions which the teachers described as examples. The graph in Figure 1 illustrates what proportion of teachers fitted into each category of the different roles they considered mentors mainly did as they worked with them in their classrooms.

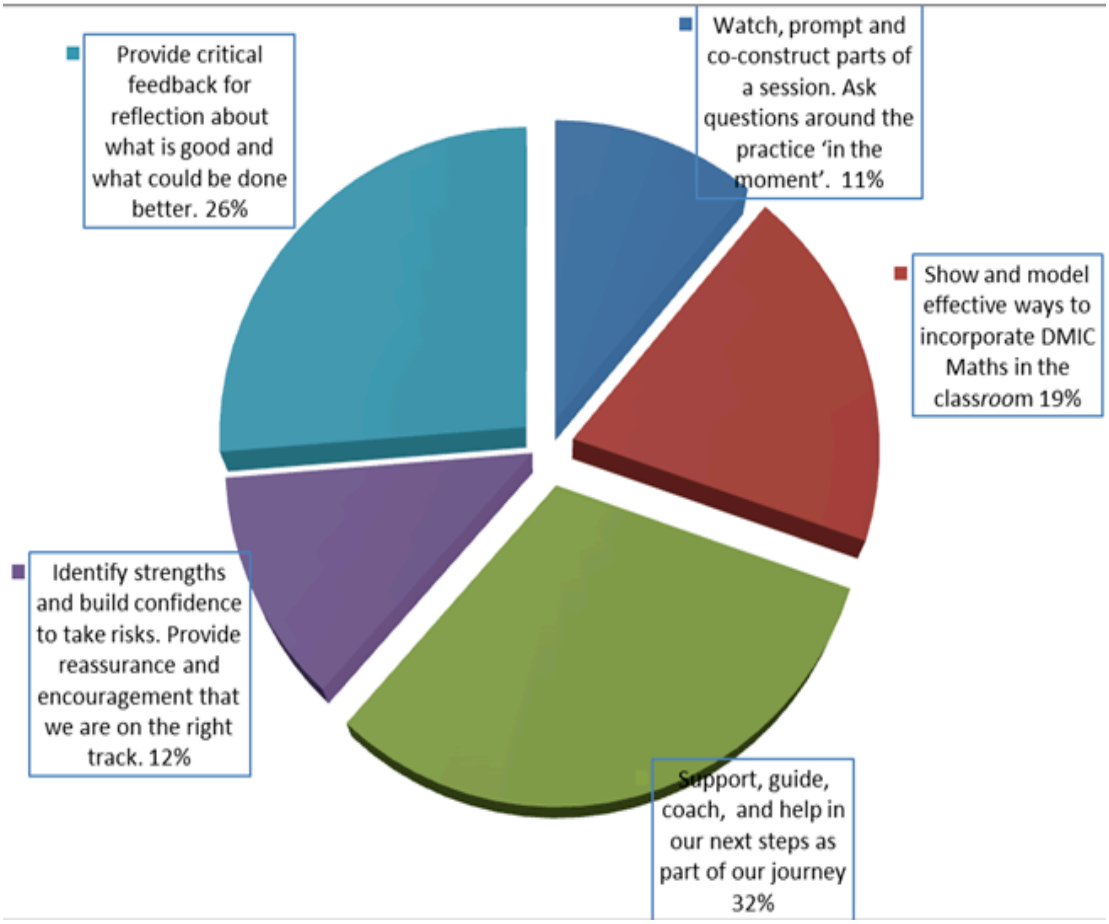

Figure 1 Teacher beliefs about the role of the mentor

Teacher beliefs about the role of the mentor

Many teachers described previous experiences in which they had been observed and presented with feedback in previous or other professional development programmes. This shaped their initial expectations:

> My previous experience with maths facilitators led me to believe they would come in, sit and observe, possibly take over the lesson when they felt I am not going the right way, change the direction of my lesson then follow up by questioning me after the lesson. This was so different and I was relieved to feel more like a team.

Thirty one percent of the teachers described the key role the mentors took as providing them with support, guidance and coaching as they taught their mathematics lessons. Many teachers described their development as part of a learning journey which both their students and they were on. As one teacher commented a mentor had explained "*that it is MY JOURNEY, not the children's"* and this had provided time and space for her personal growth in learning how to construct and work within a mathematical inquiry community.

Clearly providing time and space for teachers to rethink and reconceptualise their practices 'in the moment' were seen as important ways of ensuring teacher ownership. The teachers welcomed the replacement of a former model experienced with facilitators in previous projects where they were told what to do, and instead were encouraged to discuss, explore and grow their current expertise through focused questioning:

> When they come into my classroom they ask questions about what I have done but also what I am doing that I think is helping the students. This helps me see what is changing. They have also sent me many readings and slideshows that have helped my own practice.

The relationships they developed with the mentors were an important aspect of the ongoing change. Although the mentors were not always physically present they remained a constant contactable resource to consult with, gain feedback on their problems and planning and obtain further research articles to continue the change process. A number of teachers described the way in which they considered the reconstruction of their classroom practices as a shared journey with the mentors who had their own struggles and experiences to share and which helped them make sense of theirs:

> It's the empathy, my mentors were gentle and set me up to succeed by letting me learn *DMIC*, experimenting, "fail and fix" without feeling inadequate about learning maths the *DMIC* way. They shared with me similar stories when telling them about my stories of what happens in my lessons – when doing maths with my community of learners. They affirm my successes in *DMIC* and are very specific and precise about my next steps with my contributions. I value my mentor's honesty when giving me advice after asking for it.

The importance of a responsive and respectful partnership was a constant factor between the mentors and teachers. The teachers described the need for a relationship founded on reciprocity as important for them to be able to open up to critical feedback and cause reflective change.

As part of the journey 26% of the teachers described how they saw the role of the mentor as one in which they provided them with critical feedback which pressed them to be reflective about their classroom pedagogy. This included talking within lessons as well as after a lesson. For example, one teacher explained:

> Barbara made me reflect on my practice when observing by doing the following things. She just waited when I was stuck and gave me the opportunity to think for myself. As I was reflecting I had both ideas of my own and then after some time she gave me some ideas. She never just told.

Others saw mentor specific actions as reflective feedback:

> When Brenda called a 'pause' and helped me select who would share first, second, third and why She also said it was good that I stood back and observed even when some groups were struggling. This made me reflect on how uncomfortable it feels sometimes when you see them struggling. It was good she helped me work out the order too because then it made the big idea clear.

The short pauses 'in the moment' acted as a prompt to allow exchanges about aspects of the lesson. These prompted critical reflection but at the same time the teacher was able to feel confident about aspects of the lessons she was changing despite her discomfit.

Although all the teachers recognized their need to engage in the change process actively, 19% explained how they saw the mentor role as one in which the mentor showed and modelled effective ways to incorporate DMIC in their classroom. Although they described the need for them to see models of the practice, consistently when they described their first experiences of working with a mentor they described how they had worked alongside them as they taught a lesson rather than having the mentor model:

> I thought the role of the mentor would be to observe a lesson then give feedback which scared me slightly, as I familiarized myself with this new concept. What happened was that a mentor came in and taught alongside me. It was non-threatening and empowering. It gave me a chance to stop and ask questions, but to also see that it was 'ok' to not know what to do at times.

Other teachers also described how the pedagogical actions in the lessons were co-constructed within a learning partnership. Clearly, this contributed to their understandings and alleviated some of their anxieties as they developed mathematical inquiry

communities:

> Having Tom come in for in-class support the other day was awesome. We co-taught and he allowed me to see that it was possible to fit all the 'steps' into a single maths session. I now feel so much more confident about teaching Pasifika [*DMIC*] maths and have a more positive attitude towards it.

Another 11% of the teachers described the role of the mentor as one in which the mentor would watch, prompt and co-construct parts of a lesson with them. The teachers described the growth in their own confidence while also acknowledging how the mentor actions provided them with alternative pathways to consider:

> The mentor was really good in that she discreetly came in to the lesson – almost like a whisper to say "try this, say this" right at the critical moment. Her input steered the direction of my lesson in a way that opened up more vibrant discussion and thinking.

Other teachers described specific incidents which had disrupted their everyday patterns of behavior:

> I was helped to reflect on how I used and understood wait time. My use of wait time was to wait for 3 seconds then move on. Wrong! My mentor demonstrated how to 'wait' and this for me and my students was powerful stuff which happened in the moment in the lesson when she stepped in briefly.

Evident in the statements of the teachers is the way in which the mentors stepped in and out of lessons and provided them with fresh eyes to see the possibilities of change. Many aspects of the practices had been discussed and explored in an external professional development setting but through in-class mentoring these were brought to life.

Another 12% of teachers considered that the key role of the mentors was to identify their strengths and build their confidence to take risks. They considered that the mentors needed to provide reassurance and encouragement so that the teachers would know that they were on the right track towards developing mathematical inquiry communities:

> The mentor allowed time for me to notice and talk about what I was doing and how and where it fits. He used language such as – have you thought about? Guides rather than directs and coaches while I break through my road blocks and challenges and then celebrates my learning with me.

Clearly, the thoughtful and supportive relationship allowed the teacher to construct and reconstruct her practices. In the next section we will outline all the different actions the teachers described that they had experienced within the dynamic mentoring which they considered had caused them to reflectively change and adopt new practices.

Mentor prompts or actions which caused reflection

Teacher descriptions of what they considered was the mentor role were collapsed into five overlapping categories shown in the previous section in Figure 2. Many of these matched the mentor prompts or actions identified by teachers as causing dissonance and leading to changes in pedagogy as shown in Figure 3. However, there were some differences between what the teachers believed was the role of the mentors and the identified actions which caused reflection.

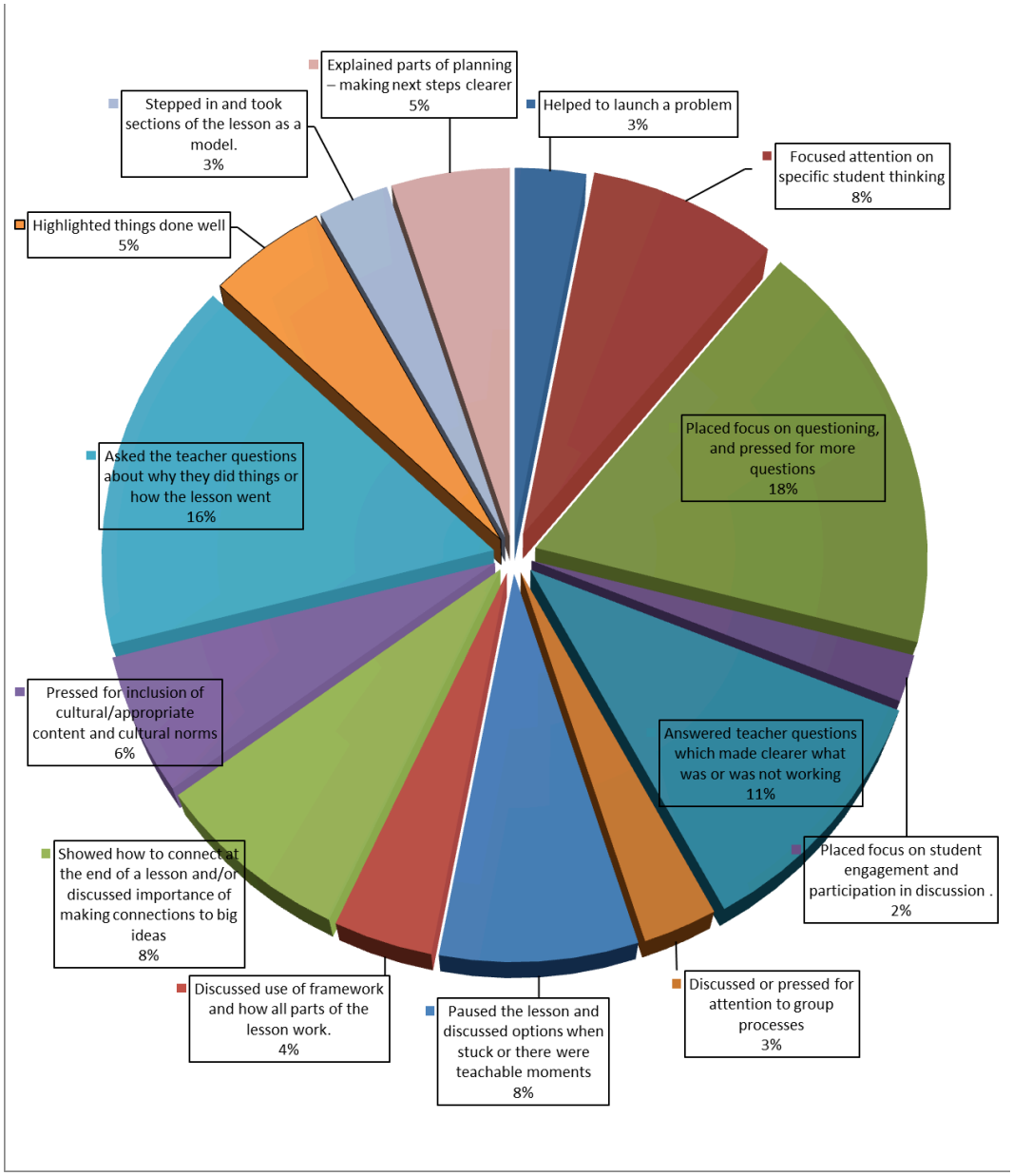

Figure 2 Mentor prompts or actions which caused reflection

Close examination of the mentor actions or prompts noted by the teachers showed that 44% of the mentor activity aligned with teacher perception of the mentor as someone who watched, prompted, and co-constructed parts of a session. All these actions took place as part of dynamic mentoring 'in the moment'. Teachers referred to 'in the moment' activity with either the mentor or the teacher calling a 'pause' (a time when the lesson pauses while the teacher and mentor talks) to explore and problem-solve the next steps:

> Barbara pausing and me pausing to discuss in the moment what to do in the connect around ratios. I asked Barbara to model and she said, 'NO.' but then she helped me to do it successfully which was so much better than watching her do it. It's her being available on the spot, in the moment, able to ask questions and discuss ideas, what to do in the middle of the lesson

Although many teachers described mentors as there to support and guide them, clearly they saw this more as a partnership which was built around the co-construction of lessons. The

teachers described how they were able to develop their own practice and feel comfortable because they felt trusted to make the right decisions in a supported way:

> The mentor asked me during the lesson, 'What are you thinking?' 'What will you do next?' This check in made me feel more confident to continue free of judgement, more open to help and confident that I was on the right track.

The carefully constructed questions used by the mentors during the lessons were powerful tools which they used as ways to empower the teachers and support them to be autonomous.

In line with mentors working in collaborative partnership with teachers 30% of the actions and prompts teachers identified linked to them being given critical feedback which caused reflection. For example, one teacher drew direct parallels with her pedagogical shifts and those she wanted to happen with her students as they interacted in the mathematical inquiry community:

> The mentors cause me to reflect. Putting a question back to me, do you think? Did you notice? It is always around the ways students are participating and contributing and in discussion around best practice; now with focus on justifying – how's that going? Would you try? Did you think about? What about? That's been our focus to get the students to ask and answer challenging questions to dig deeper so we should too.

This teacher had seen the link between what they were challenging the students to do and how they were being positioned to justify their pedagogical practices. The mentor's actions in reflecting the questions back to the teachers caused them to explore the pedagogy they were enacting at a deeper and more intellectual level.

Showing and modelling effective ways to incorporate *DMIC* mathematics in the classroom connected to 16% of the mentor actions described by the teachers. Often the actions were linked to constructing contextual problems or specific aspects of planning including recognising the opportunities available in particular tasks.

> Yesterday I told Sam I still really struggle with the connect. After looking at my planning with Sam I realised it was the big idea that I had wrong and was struggling with as a teacher. I misunderstood what generalising is and realised how important it is in extending and using their learning.

Many teachers identified that writing problems and constructing tasks were key to them being able to ensure that tasks were challenging, group worthy and embedded in culturally relevant contexts:

> The mentor reworked some of my problems with me to make them more challenging and them more authentic and culturally responsive. She has encouraged my attempts to build greater cultural responsiveness into my maths programme and that is good because the students need to be the experts and the cultural context for the problem is an important part of this but I did not know where to begin.

Clearly, they considered their discussions with the mentors around planning and the way in which the mentors pressed them to increase the challenge and anticipate all possible outcomes important. Making problems contextually real and culturally responsive with the help of the mentors was another area they described as important for accelerating their development.

Many actions overlapped with what the teachers considered fitted within a view of the mentor as a guide or coach. The mentors not only caused them to reflectively change their practices; they also modelled 'in the moment' the practices they were promoting:

> It's this thinking about culture that has made me shift. I loved it when one of the mentors did what I did – used some Maori, Samoan words for things in the problem or words of encouragement for the

> kids. I can see how the children appreciate and value when a palagi mentor speaks their lingo. I have been encouraged to do this and am thrilled to testify that I see the DMIC way of connecting with Pasifika children lifts their status, self-esteem and confidence, cultural identity and enjoyment. What a learning journey.

What was evident was that the mentor actions caused the teachers to not only focus on their current pedagogy—it also caused them to be future-focused towards what the teachers considered needed changing in their pedagogy towards establishing culturally responsive mathematical inquiry learning communities. In doing so a number of teachers recognised how their own relationship with mathematics had shifted:

> Facilitated a pedagogical shift in my thinking around developing a greater mathematical disposition for myself and my students

Clearly the teachers recognised the importance of developing both strong cultural identities and mathematical dispositions of their students. A number also referred to how the mentors had caused them to rethink their own cultural identity and mathematical disposition.

In this section we explored teacher perceptions related to the role of the mentors in their classrooms. In the next section we will explore a classroom episode which will provide a picture of the actions mentors take as they co-construct lessons with the teachers.

The co-construction of a lesson

The section of the lesson we have selected to illustrate the different actions a mentor uses in a lesson occurred during a small group discussion. The students are working within collaborative groups of four on a challenging problem. Initially the mentor has focussed the teacher on listening to the student reasoning so that he can help her sequence the explanations for the plenary. His opening question draws the teacher into reflecting on the difficulties she has in sense making and recording what they are saying. In response he directly tells her that she does need to be able to do this.

Code	Goal	Mentor move	Teacher move	Action
Evaluative feedback	Focusing attention on assessing student reasoning	*You pick up a lot of things while you are listening and observing but it has to have a purpose. So what are you going to use it for?*	Teacher describes the difficulty of recording student reasoning while listening to them.	Prompts reflection
Directive feedback	Scaffolding enactment	*Keep the paper with you and record what is important.*	*Like how they explain?*	Provides a strategy
Directive feedback	Coaching for sequencing explanations	*So you might just want to write that down. Whatever strategy they are using if it is useful for you.*	*So I can see that group is doing times table.*	Directs teacher attention to next steps

His actions illustrate his expectation that the teacher will make sense of student reasoning but that there needs to be a purpose for doing this. However, when a misconception emerges the mentor presses the teacher to examine its basis and act on that. The mentor models ‘in the moment’ wait time so that both he and the teacher are able to make sense of what is happening. He then stands looking at what the students are doing and looks at the teacher before he responds to her question. This provides space for her to begin to construct her next response. His suggestion that she needs to encourage more talking also positions her to make the next move.

Code	Goal	Mentor move	Teacher move	Action
Evaluative feedback	Attending to errors and orienting students to each other's perspectives	There is a long pause *What you do is get them talking about it, get the different people to explain it, to agree, disagree, explain why so get them talking about it but they have to be talking so if they still do not get you could bring it to the large group.*	*You see with this one that has a misconception there do I stop them and correct it right then?*	Answers teacher questions related to 'in the moment' problems
Evaluative feedback	Modelling think/wait time	Watches as the group works then reads the problem again.	The teacher watches and does the same.	Models behavior
Directive feedback	Facilitating a mini-relaunch	*That group there it would be a good idea to get them talking about it and get them back to the context. It is like a mini-relaunch but just this group. We can do it now the rest are okay now so let's respond to the need here.*	The teacher engages the students in a discussion about what is happening in the story and what the problem is asking them to do. She reminds them of their need to listen and agree or disagree. Then she listens to them and watches then she asks: *Do I need to push them to say why?*	Provides next steps

Her question to the mentor shows that she is still struggling with what the key elements in the problem are and so the mentor scaffolds her to consider the key elements in the problem. Through these actions she is empowered to take the lead with the students.

Code	Goal	Mentor move	Teacher move	Action
Evaluative feedback	Scaffolding teacher questioning	Mentor to the teacher: *Think of the problem. How many seedlings in one row? See if they want to start it a different way? Let them keep talking about it and see.*	Teacher to the children: *Did you say 12 rows? Is it 12 rows or 12 seedlings in a row? Can you draw it? This is a garden area and this is a row, can someone draw it?*	Presses teacher to sense-make

In this excerpt the mentor used a balance of evaluative and directive feedback. His actions provided examples of dynamic mentoring where dissonance was created which caused the teacher to explore options. In some instances the mentor directly gave the teacher the next moves to make and in other instances he positioned the teacher to make 'in the moment' decisions about her next steps. Through elements of coaching, and modelling or what we call dynamic mentoring the teacher was able to grow her own pedagogy.

Discussion and Conclusion

We have written this article to capture some of the work we are currently doing in the *DMIC* project. We have chosen to focus on the work of mentors because they are an important aspect of the transformative work of teachers we see in our project classrooms.

The construction of mathematical inquiry communities is complex and challenging for teachers and so the support of mentors has been one way to begin and sustain change.

The mentor role in the classrooms is shown to be a dynamic one. From moment to moment their role shifts from questioner to answerer, from coach to nurturer and from a resource to a model within an adaptive and flexible approach. Clearly, as Fletcher (2012) suggested mentoring and coaching are on different ends of a continuum but in our project elements of both emerge and overlap 'in the moment' as dynamic mentoring occurs. This was evident when the teachers described the actions or prompts mentors used which caused the dissonance which led to changes in their practices. When considering the role the mentor took in the classroom excerpt we can see how he shifted back and forwards in his actions and responses dependent on the teacher's whole situation. His actions exemplified the way in which he was considering her responses and what they represented to carefully scaffold her next moves and therefore change her perceptions. As Kise (2005) says, when teacher's strengths and attitudes are individually considered and responded to they are able to reconstruct their pedagogy and beliefs.

In this work taking an inquiry stance is central to the work of both the mentors and mentees. The teachers identified the importance of them being pressed to consider aspects of their practices. At the same time they recognised the way in which their questioning around their practice opened up new areas of reflections. Cochrane-Smith and Lytle (1999) argue that an inquiry stance supports both mentors and mentees to envisage and theorise their practice. This is evident in our project where all participants need to be able to construct deeper understanding about what is possible and have reflective discussions about the new ways of teaching and learning mathematics introduced within *DMIC*.

An inquiry stance in which critical analysis occurs is reliant on the mentor-mentee relationship. Evident in the data of both the mentor-mentee interactions in the classroom and the teacher perceptions of the role of their mentors indicated the importance of their relationship. This aligns with Carr and her colleagues (2005) who argue the need for the relationship between the mentor and mentee to be a holistic, shared, reflective and dynamic process in which all participants have committed to collaborative construction and reconstruction of best practice mathematics pedagogy. Learning by leading is at the core of this work and so we finish with the voice of one of the mentors:

> I think what we do is more in line with ambitious mentoring. It's like ambitious teaching, but its ambitious mentoring of teachers and school leaders. So an approach that I personally like to take is a non-deficit one so looking at what teachers can do in their classrooms then that will automatically give me what their next steps are. Instead of looking for what they can't do, look for what they can do and affirm those things and then look at what the next steps are. Those are the sort of things I would respond to in class and give some advice on what they can do as next steps. A lot of what we do in the class is get them to reflect so if I notice something I need to respond to in the moment I might even ask the teacher a question to get them to reflect on their practice. It might be asking them questions about what is coming up in the lesson, so we are not seen as experts coming in and telling teachers what to do, so it is more of a co-constructivist approach where we are co-constructing lessons with teachers.

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